

undersigned attorney made a provisional election to prosecute claims 1-12 of the application. Applicants hereby affirm the election to prosecute claims 1-12 of the application. Applicants will cancel the non-elected claims from the application upon the filing of a divisional application.

The Examiner objected to the oath/declaration and requested that Applicants provide their complete post office address. In a telephone conversation with the undersigned attorney on January 8, 2003, Examiner J. Boyde agreed that the deficiency could be overcome by simply filing an application data sheet. The application data sheet accompanies this reply.

The Examiner objected to claims 1-12 due to an informality and rejected claims 1-12 under 35 U.S.C § 112, second paragraph. In response to the objection to the claims and to the rejection of the claims under 35 U.S.C § 112, Applicants have amended the claims.

In Paragraph 11 of the Office Action, the Examiner noted that claim 1 does not specify the order of the laminate layers. Applicants have amended claim 1 to specify the order of the laminate layers. Support for this amendment can be found in the specification at page 6, lines 1-8.

In Paragraph 8 of the Office Action, the Examiner objected that the phrase "comprised attached" in claim 1 was unclear, and in Paragraph 12 of the Office Action, the Examiner noted that claim 1 does not specify what the moisture vapor control layer comprises. In response, Applicants have amended claim 1 to specify that the moisture vapor control layer is comprised of a polymer film. Support for this amendment can be found in cancelled claim 3 and in the specification at page 18, lines 23-33.

In Paragraph 13 of the Office Action, the Examiner noted that dependent claim 7 recited a process, but depended from claim 6 which is not directed to a process. Applicants have corrected this inadvertent error by amending claim 7 to recite the laminate structure of claim 6.

In Paragraph 14 of the Office Action, the Examiner objection that the test method ISO 2411 referenced in the claim was not set forth in the specification. A copy of ISO 2411 is attached. This test method for measuring the bonding strength of coated fabrics is well very know to those skilled in the art.

In Paragraph 15 of the Office Action, the Examiner indicated that the term "film layers" lacked proper antecedent basis. In response, Applicants have amended claim 7 to specify each of the layers of the laminate structure.

In Paragraph 16 of the Office Action, the Examiner noted that claim 12 does not specify the location of certain layers. Applicants have amended claim 12 to specify the location of the layers recited in the claim. Support for this amendment can be found in the specification at page 23, line 30 – page 24, line 3.

In Paragraph 18 of the Office Action, the Examiner rejected claims 1-12 under 35 U.S.C § 103(a) in view of European patent application 94300233.7 of Trouilhet et al. ("Trouilhet") in view of U.S. Patent No. 6,214,477 to Wofford et al. ("Wofford") and U.S. Patent No. 5,532,053 to Mueller ("Mueller"). Trouilhet discloses a laminate comprised of a porous substrate laminated with a liquid barrier layer that is permeable to moisture vapor, such as a copolyetherester film. The liquid barrier layer is, in turn, coated with a release layer that serves to protect the relatively thin moisture vapor control layer during processing. Trouilhet further discloses that a tie layer can be applied between the porous substrate and the liquid barrier layer in order to improve the adhesion between the substrate and the liquid barrier layer. Trouilhet does not disclose or suggest the use of a moisture vapor control layer between the substrate on one side and a tie layer and a copolyetherester-containing layer on the other side, as is recited in claim 1 of the application. Trouilhet further does not disclose a laminate structure in which a moisture vapor control layer adjacent to the substrate is used to create a laminate structure in which the moisture vapor transmission rate in the direction going from the copolyetherester-containing layer toward the substrate is greater than the moisture vapor transmission rate in the direction going from the substrate toward the copolyetherester-containing layer. Applicants have incorporated the differential moisture vapor transmission limitation of cancelled claim 10 into claim 1 so as to more clearly distinguish the claimed invention from Trouilhet. The above-discussed aspects of the claimed invention that are not disclosed in Trouilhet are similarly not disclosed or suggested by the cited Wofford or Mueller references. Accordingly, it is not possible to combine the cited references so as to render obvious the claimed invention.

In view of the above amendments and remarks, Applicants assert that this application contains patentable subject matter in appropriate form. Reconsideration and withdrawal of the objections and rejections and allowance of all pending claims

are respectfully solicited. If there are any additional fees due in connection with the filing of this Amendment, the Commissioner is authorized to charge such fees to our Deposit Account No. 04-1928.

Respectfully submitted,

  
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Attachment (International Standard ISO 2411), Application Data Sheet

**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

In showing the changes, deleted material is shown as bracketed, and inserted material is shown underlined.

**IN THE CLAIMS:**

1. (amended) A laminate structure comprising:
  - (i) a substrate layer comprising a woven or non-woven material,
  - (ii) a moisture vapor control layer comprised of a polymer film attached to said substrate and adjacent to said substrate,
  - (iii) a tie layer comprising one or more copolymers comprising from about 30 to about 90 weight percent ethylene co-monomer units and from about 10 to about 70 weight percent vinyl acetate co-monomer units, said tie layer being adjacent to said moisture vapor control layer such that said moisture vapor control layer is positioned between said substrate layer and said tie layer, [and]
  - (iv) a layer comprising one or more copolyetherester(s) in an amount of at least 50 weight percent based on the total amount of polymer in the layer, said copolyetherester-containing layer being adjacent to said tie layer and on a surface of the tie layer remote from the substrate layer, and wherein
$$\text{MVTR}_{\text{CAS}} > \text{MVTR}_{\text{SAC}}$$
wherein MVTR<sub>CAS</sub> is the MVTR in the direction away from the copolyetherester-containing layer and tie layer and towards the substrate layer, and MVTR<sub>SAC</sub> is the MVTR in the direction away from the substrate layer and towards the tie layer and copolyetherester-containing layer.
2. (amended) A laminate structure according to claim 1, wherein the moisture vapor control layer is comprised of polyethylene, polypropylene, or a copolymer thereof comprising ethylene and/or propylene as the main repeating units.
7. (amended) A laminate structure according to [The process of] claim 6 wherein the bonding strength between the substrate layer, the moisture vapor control layer, the tie layer and the copolyetherester-containing layer[and the film layers], measured according to ISO 2411, is at least 1 N/m.
11. (amended) A laminate structure according to claim 1[10] wherein the ratio of MVTR<sub>CAS</sub> / MVTR<sub>SAC</sub> is at least about 1.5.

12. (amended) A laminate structure according to claim 1, further comprising:
- (v) an adhesive or primer adjacent the copolyetherester-containing layer on a surface of the copolyetherester-containing layer remote from the tie layer, and
- (vi) a second substrate layer comprising at least 50 weight percent of a polyolefin, said second substrate layer being adjacent to the adhesive or primer on a surface of the adhesive or primer remote from the copolyetherester-containing layer.

# INTERNATIONAL STANDARD

ISO  
2411

Second edition  
1991-09-15

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## Rubber- or plastics-coated fabrics — Determination of coating adhesion

*Supports textiles revêtus de caoutchouc ou de plastique —  
Détermination de l'adhérence du revêtement*



Reference number  
ISO 2411:1991(E)

**ISO 2411:1991(E)**

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 2411 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*.

This second edition cancels and replaces the first edition (ISO 2411:1973), of which it constitutes a technical revision.

Annex A forms an integral part of this International Standard.

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**INTERNATIONAL STANDARD****ISO 2411:1991(E)**

# Rubber- or plastics-coated fabrics — Determination of coating adhesion

## 1 Scope

This International Standard specifies a method of test for the determination of the coating adhesion of fabrics coated with vulcanized rubber or plastics.

## 2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 2231:1989, *Rubber- or plastics-coated fabrics — Standard atmospheres for conditioning and testing*.

## 3 Definitions

For the purposes of this International Standard, the following definitions apply.

**3.1 coating-to-fabric peel:** Separation with no coating polymer residue remaining on the substrate fabric.

**3.2 coating or film delamination:** The splitting of a multilayer coating, leaving one or more layers of coating film residue on the substrate fabric.

**3.3 fabric delamination:** The splitting or delamination of substrate fabric, leaving a partial layer or complete fabric laminate adhering to the coating.

**NOTE 1** An example of this is in the case of coated nonwoven laminates, when the nonwoven textile element may fall due to the coating adhesion strength being greater than the between-fibre cohesion of the nonwoven textile fabric.

**3.4 fabric failure:** The breaking of substrate fabric during testing, indicating that the coating adhesion strength is greater than the substrate fabric strength.

**3.5 Inseparable:** Used to describe a coating which is incapable of peeling because it breaks during preparation or testing, indicating that the coating adhesion strength is greater than the coating polymer strength.

**3.6 partial film tear:** Delamination, leaving patches of coating polymer still adhering to the substrate fabric.

**3.7 fabric surface failure:** The separation, from the surface layer of the substrate fabric, of portions of fabric pile or groups of fibres which adhere to the removed surface coating polymer.

## 4 Apparatus

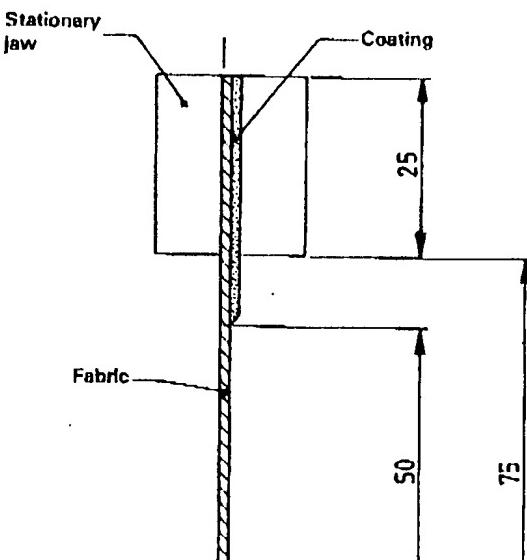
**4.1 Autographic strength-testing machine,** having one jaw movable at a constant rate within the range 100 mm/min  $\pm$  10 mm/min. The load range shall be such that the force required to cause separation is within 15 % to 85 % of the maximum scale reading.

ISO 2411:1991(E)

## 5 Preparation of test specimens

### 5.1 General

For the determination of coating adhesion, prepare 10 test specimens, in the manner appropriate to the type of coating as given in 5.2 and 5.3. Irrespective of the method of separation to be used, five with their length parallel to the longitudinal direction and five with their length parallel to the transverse direction of the coated fabric under test. Each specimen shall be not less than 75 mm wide and not less than 200 mm long. No specimen shall be taken within 50 mm of a selvedge. In the case of coated fabrics with substrate fabrics having a pile, prepare 10 specimens, five in the direction of the pile and five against the direction of the pile.



### 5.2 Thick coatings

Where the strength of the coating layer exceeds the force of the adhesive bond to the substrate fabric, prepare the test specimen by carefully cutting through the coating to the substrate fabric at right angles to the length of the specimen. From this cut, separate carefully the coating film from the substrate fabric for a distance sufficient to enable the test specimen to be mounted in the jaws of the apparatus. Trim the width of the specimen to  $50 \text{ mm} \pm 0.5 \text{ mm}$ , taking care to avoid damage to the longitudinal threads of the substrate fabric.

Condition the test specimens in accordance with ISO 2231.

Clamp the coated end of the specimen in the stationary jaw and the coating film in the traversing or movable jaw of the testing apparatus as shown in figure 1.

### 5.3 Thin coatings and coatings of low cohesive strength

Where the coating layer is not sufficiently strong to be stripped continuously from the substrate fabric, but where the coating layer can be distinctly identified from the substrate fabric and can be cut through separately, bond two specimens of the same material face to face, avoiding the first 50 mm, using an adhesive system suitable for the type of coating being evaluated. It is important that the adhesive chosen does not cause the coating to swell irreversibly or otherwise affect the coating/fabric strength.

**NOTE 2** In contractual situations, it may be advisable for the interested parties mutually to agree upon the type of adhesive to be used.

Roll the composite specimen lengthwise at least twice with a roller 75 mm wide and of mass 2 kg in order to ensure a good bond.

Where thermal-welding techniques are used in the production process, the interested parties may prefer to use such techniques in conducting the test, but care shall be taken to ensure that spurious results

If necessary, it is permissible to use a plain weave cotton fabric, desized and bleached, in place of one of the coated specimens.

Condition the test specimens in accordance with ISO 2231.

Clamp the end of the specimen under test in the stationary jaw and the undoped end of the composite specimen in the traversing jaw of the test apparatus as shown in figure 2.

**NOTE 3** Where the coating surface is to be treated in any way which may inhibit the coating-to-coating bond, for example siliconized, it is recommended that the test be conducted before any such treatment is applied.

If, in conducting the test, the adhesion between the coating surfaces fails, so that no separation of the coating from the fabric takes place, the load at which this occurs shall not be taken as a measure of the coating adhesion strength but merely as a measure of the cohesive strength of the adhesive.

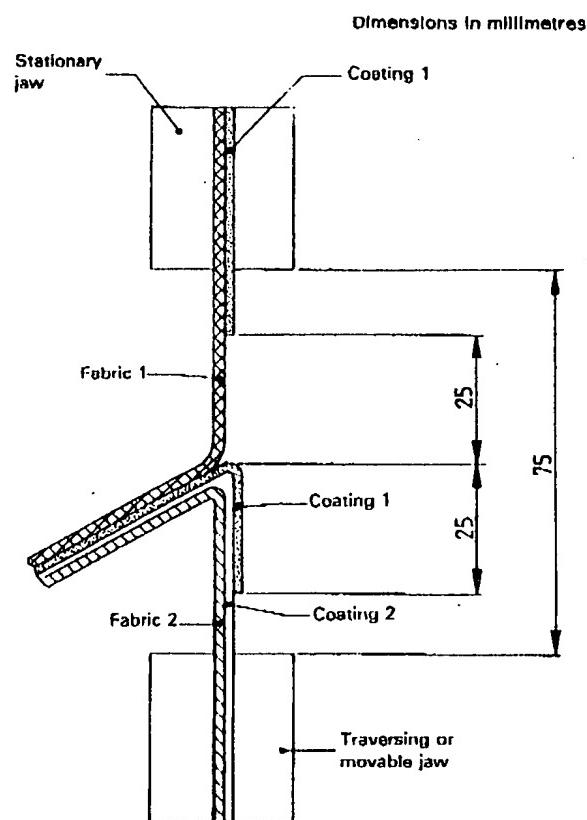


Figure 2 — Mounting of thin coatings and coatings of low adhesive strength

## 6 Test atmosphere

Carry out the test in one of the atmospheres specified in ISO 2231.

## 7 Procedure

Fix the separated ends of the test specimen in the grips of the testing machine and adjust it so that the tension is distributed uniformly, no twisting of the test piece occurs during the test and the angle of separation is approximately 180°. It is important to ensure that the strips of test specimen held in the grips and the line of separation of the plies lie in the same specimen plane as shown in figures 1 and 2 (i.e. that one strip does not lie substantially out of the plane of the other).

Set the force-measuring system at zero. Continue the ply separation and record the force over a length of 100 mm.

## 8 Calculation and expression of results

If the trace obtained consists of a series of peaks, each representing the load at which the plies have separated, and troughs corresponding to the fallback of the load, determine the median value of the peaks in accordance with normative annex A. Calculate the mean of the median values for the five test specimens in each of the directions tested (see 5.1) and express this, in newtons per 50 mm width, to the nearest newton, as the coating adhesion strength. Give also the mean of the maximum values obtained, if required. In the case where the substrate fabric has a pile, calculate the two means of each of the five values obtained (see 5.1).

## 9 Test report

The test report shall include the following particulars:

- a reference to this International Standard;
- the details of the coated fabric from which the test pieces have been taken;
- the number of test specimens and the direction of cutting with relation to the coated fabric, the coating face submitted to the test, if necessary, and the adhesion strength values for each of the test specimens;
- the arithmetic-mean adhesion strength values in each direction and, if necessary, for each of the two faces;
- the conditioning and testing atmosphere used (see ISO 2231);

- f) the rate of separation of the grips if other than 100 mm/min  $\pm$  10 mm/min;
- g) the type of test specimen, i.e. whether cemented or non-cemented or thermal-welded (and, in the last case, the method of welding used);
- h) the type of separation (see clause 3);
- i) details of any operation not specified in this International Standard or in the International Standard to which reference is made, and any other factors which may have influenced the results.